

REMARKS

The examiner rejected claims 22 and 24 as indefinite under 35 U.S.C. § 112 first and second paragraphs, because the term "state" used to describe the memory was deemed to be unclear and lacking support in the specification. Claims 22 and 24 are amended to remove usage of this term.

The examiner rejected claims 20-25, 35-36, 38-51, and 57-59 as unpatentable over Zimmer (U.S. 5,175, 392) in view of Endo (U.S. 6,630,890), claims 26 and 37 as unpatentable over Zimmer (U.S. 5,175, 392) in view of Endo (U.S. 6,630,890) and Besson (U.S. 6,462,672), claims 27-34, 56 and 71 as unpatentable over Zimmer (U.S. 5,175, 392) in view of Endo (U.S. 6,630,890) and Laborde (U.S. 6,816,082), and claims 52 and 67 as unpatentable over Zimmer (U.S. 5,175, 392) in view of Endo (U.S. 6,630,890) and Tubel (U.S. 5,730,219).

With regard to claim 20, the examiner notes that Zimmer discloses one telemetric communications interface (30) operatively coupled to the memory, but Zimmer does not disclose a first and second telemetric communications interface disposed in each sensor pod in the string of sensor pods. The examiner asserts that Endo discloses first and second bi-directional interfaces, and that it would have been obvious to modify Zimmer to include first and second telemetric interfaces as taught by Endo in order to be able to send data and command signals from the shuttles to the tool cartridge and surface unit and vice versa.

Independent claim 20 is amended to more precisely define the subject matter the applicant regards as the invention. As amended herein, claim 20 includes the limitations that the memory of each seismic pod is in bi-directional communication with the first and second telemetric communications interfaces, and that a communications path from the sensor of the second pod to the telemetry and control module passes through the memory of the second pod,

the first telemetric interface of the second pod, the second telemetric interface of the first pod, the memory of the pod, and the first telemetric interface of the first pod.

The amendments are fully supported by the specification. The Figure 5 schematic diagram clearly shows double arrowheads (functionally designating information flow in both directions) between the communications converters 112, 114 and the upper and lower connectors 42, 44, respectively, and between the communications converters 112, 114 and the processor and RAM memory 120, 28'. When switch 132 is open, signals must pass through the communications converters 112, 114 and RAM memory 120, 28' of each sensor pod.

In the Zimmer system, the seismic data in each sensor pod is transmitted in only one direction from the memory 31 to the telemetry unit 30. See, for example: Zimmer col. 2 ll. 51-55 ("Thereafter, a telemetry unit [30] transmits from the localized memory [31] to a main memory [25] and the main memory [25], in conjunction with a main telemetry system [24], transmits data up the logging cable for recovery at the surface") and col. 11 ll. 13-21 ("wherein each of said M identical recording stations [15] includes a [sic] associated memory [31] and further including the steps of converting seismic signals at said M stations into a recordable form for the associated memory, storing signals in the associated memory [31] for a finite interval, and in specific sequence, making the telemetry transfer from the M recording station memories into the main memory [25]"). Zimmer does not teach that the memory 31 is in bi-directional communication with the telemetry unit 30.

Likewise, although Endo discloses bi-directional telemetric interfaces in each shuttle, Endo does not teach coupling the telemetric interfaces to a multi-bit memory. Rather, the shuttles 160 contain no memory structured for receiving seismic data, and seismic data are transmitted continuously up the array of shuttles to the buffer memory MEM in the cartridge

150. Endo does state that the command and data signals are re-timed at each shuttle, but discloses no structure or method for accomplishing the re-timing. However, one of ordinary skill in the art at the time of the invention would recognize that Siems (U.S. 4,072,923) teaches using a single-bit 'D' flip-flop circuit for re-timing seismic signals between seismic pods. *See, for example*, Siems col. 7 ll. 14-49 ("[I]t is necessary to amplify and regenerate the data pulses at each transceiver unit 12. But in order to regenerate the data pulses at each transceiver unit, they must first be resynchronized with the local clock. Local clock 108 (FIG. 3) synchronizes phase-encoded NRZ data words in data synchronizer 106. . . . The regenerator and synchronizer network 60 consists of flip-flops 70, 71. . . .").

Zimmer discloses a single telemetric communications interface having a unidirectional communication connection with multi-bit sensor pod memory (i.e., the telemetric interface only receives data from the memory, and not vice versa), and Endo discloses first and second bi-directional communications interfaces having no communication connection with a multi-bit sensor pod memory (because no sensor pod memory exists in the Endo system); Zimmer in combination with Endo do not disclose a system with first and second telemetric interface in bi-directional communication with multi-bit pod memory, as required by claim 20. Likewise, neither Zimmer nor Endo (nor any other cited reference, for that matter) disclose or suggest a seismic system having a bi-directional communications path that passes through first and second telemetric interfaces and multi-bit memory in each sensor pod, i.e., a bucket-brigade style of data transfer through multi-bit memory in each pod, as required by claim 20. Where the references taken together fail to disclose all of the limitations in the claim, a prima facie case of obviousness is not shown. In re Grasselli, 713 F.2d 731, 743, 281 USPQ 769, 779 (Fed. Cir. 1983). Because Zimmer in combination with Endo does not disclose a system with first and second telemetric

interface in bi-directional communication with multi-bit pod memory or a bi-directional communications path that passes through first and second telemetric interfaces and multi-bit memory in each sensor pod, it is improper to combine Zimmer and Endo to arrive at the invention of claim 20. Therefore, applicant submits that a § 103 rejection of claim 20, as amended herein, is improper.

Furthermore, Endo teaches away from the recited combination. Endo states, "One problem encountered with multi-level borehole seismic tools is that the large quantity of data recorded for each shot is greater than can be handled by current wireline telemetry systems. The tool described in U.S. Pat. No. 5,157,392 attempts to overcome this problem by providing memory in each sonde and in a downhole cartridge which is connected to the logging cable. In use, a signal is sent from a surface system to the cartridge to instruct activation of the measuring devices in each sonde for a predetermined time after the signal is received. This signal is coordinated with the firing of the surface source so that the sondes are active when the signal arrives. In order to overcome the limitations of the telemetry system, the sondes and the downhole cartridge are provided with buffers or memories which store the recorded signals. The stored signals are then telemetered to the surface over the logging cable when the sensors are not recording and when the tool is being moved in the borehole. . . . The systems described above have certain limitations. It is not possible to acquire data continuously and the surface system must be closely associated with the source firing system. This is often not possible, especially in marine environments. It is also not possible with this system to decide after the fact which data is to be telemetered to the surface and which can be discarded." Endo col. 2 ll. 19-54.

Teaching away from the claimed invention is the antithesis of the art's suggesting the desirability of the combination to the person of ordinary skill in the art and is a *per se*

demonstration of lack of *prima facie* obviousness. In re Dow Chemical Co., 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988); In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Nielson, 816 F.2d 1567, 2 USPQ2d 1525 (Fed. Cir. 1987). Therefore, applicant submits that a § 103 rejection of claim 20, as amended herein, is improper.

Because independent claim 20, as amended herein, is patentably distinct over Zimmer in view of Endo, claims 21, 22, and 24-74 dependent thereon, are also patentably distinct over Zimmer in view of Endo.

Claims 96-113 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Zimmer in view of Besson. The Examiner cited Besson as teaching a bucket brigade transfer. Independent claims 96, and independent claim 113 as amended herein, each contain a limitation that the data is transferred in a bucket brigade fashion, where a bucket brigade transfer is defined as each sensor pod transmitting data stored in its memory to a first adjacent device in the string and *concurrently or subsequently* receiving data from a second adjacent device in the string, which is then transferred to the first adjacent device in the same manner, and so on.

Applicant respectfully submits that Besson does not disclose a bucket brigade transfer as required by claims 96 and 113. Rather, Besson teaches a relay method of transmitting data in which each sensing device receives data from an adjacent device and combines that data with its own data before transmitting the any data to the next device in the array:

At the sensing unit 22 furthest down the wellbore, at the lower end of the array, the acquired data signal from sensors 50 is simply passed through the processing unit 46 and onwardly transmitted as an acoustic signal to the next receiver in the array by its transceiver 44. The transceiver 48 of the neighbouring unit 24 detects the acoustic signal from the earlier unit 22 and passes the received signal and the locally acquired signal from its own sensors 50 to its processing unit 46 where the received data signal and the locally acquired signal are combined. The combined signal is then passed to transceiver 44 which transmits the combined signal to the next sensing unit 26 in the array. In this way data is relayed along the array in a "bucket brigade" mode, data being acquired by each sensing unit and added to the data acquired by units lower in the array *before*

onward transmission. This continues along the array until the sensing unit 32 highest in the wellbore at the upper end of the array transmits the total combined data from all the sensing units to the master unit 34, by acoustic transmission through the casing 12 and the tubing 14.

In this way information from the sensor units where the master unit 34 is outside their transmission range, can still be forwarded to the master unit by relaying the signal along the array. So data is transmitted from the bottom of the well (the toe of the well) to the top of the well (the heel of the well), each sensing unit relaying its own acquired data together with the data acquired by sensing units situated below it to the next higher sensing unit in the array. Besson col. 4 ll. 27-54 (emphasis added).

By namesake analogy, in the bucket brigade according to the invention, each fireman passes a bucket of water forward while concurrently or soon as possible thereafter fetching the bucket from the fireman behind him to provide a fast and steady flow of water to extinguish the fire. However, in Besson's bucket brigade, the fireman at the rear of the queue passes his bucket to the fireman in front of him, who empties the contents into his own bucket, thus creating a larger volume of water, which is passed forward, and so on. As the transfer continues, each fireman handles a larger and larger bucket, while the fire grows unchecked, until the fireman at the front dumps the large bucket containing the content of all of the previous buckets on the fire.

Claims 96 and 113 clearly require the transfer of data from a sensor pod concurrently with or prior to reception of data from another pod, and Besson teaches the opposite—the reception of data prior to the transfer of data. No where in the specification or claims does Besson disclose or suggest a buck brigade transfer of data as claimed. Therefore, Zimmer in combination with Besson fail to disclose all of the claim limitations. Where the references taken together fail to disclose all of the limitations in the claim, a prima facie case of obviousness is not shown. In re Grasselli, 713 F.2d 731, 743, 281 USPQ 769, 779 (Fed. Cir. 1983). Therefore, claims 96 and 113 are patentably distinct over Zimmer in view of Besson.

Furthermore, claim 96, with its means plus function recital ("means for transmitting . . ."), is presumed to fall under 35 U.S.C. § 112 sixth paragraph. Callicrate v. Wadsworth Mfg., Inc., 427 F.3d 1361, 1368, 77 USPQ2d 1041 (Fed. Cir. 2005). Under the jurisprudence of In re Donaldson Co., Inc., the sixth paragraph of § 112, which states that a means-plus-function claim shall be construed to cover corresponding structure, material, or acts described in the specification and equivalents thereof, applies to claim interpretation arising as part of patentability determination by the Patent and Trademark Office. In re Donaldson Co., Inc., 29 USPQ2d 1845 (Fed. Cir. 1994).

In order to construe a claim under the sixth paragraph, it is necessary to identify the claimed function. Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1376-77, 58 USPQ2d 1801 (Fed. Cir. 2001). The function of the claim 96 limitation "means for transmitting . . ." is clearly "transmitting said data from said memory to said telemetry and control module and vice versa in a bucket brigade transfer, where a bucket brigade transfer is defined by each sensor pod transmitting data stored in the memory of said sensor pod to a memory of an adjacent device in said string of intelligent sensor pods in a first direction and concurrently receiving data, if any, from a memory of an adjacent device in said string of intelligent sensor pods in a second direction opposite said first direction, if any, and storing said received data in said memory of said sensor pod."

As discussed above, the Besson device does not perform this function because it transfers data only after receiving and combining data from its adjacent device. Therefore, claim 96 is not rendered obvious by Zimmer in combination with Besson. Because independent claim 96 is patentably distinct over Zimmer in view of Besson, claims 97-112 dependent thereon, are also patentably distinct over Zimmer in view of Besson.

Claims 96-103, 105, 106, 108-110, 112 and 113 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Zimmer in view of Endo. Office Action at 4. However, unlike the rejections of claims 96-113 as unpatentable over Zimmer in view of Besson or the rejections of claims 20-26, 35-51, 53-55, and 57-59 as unpatentable over Zimmer in view of Endo (or Endo and Besson or Laborde or Tubel), no details as to the specific grounds for the rejection have been provided.

Applicant traverses the rejections of claims 96-103, 105, 108-110 and 112 as improper. Independent claim 96 includes a means plus function limitation and is presumed to fall under 35 U.S.C. § 112 sixth paragraph. Callicrate v. Wadsworth Mfg., Inc., 427 F.3d 1361, 1368, 77 USPQ2d 1041 (Fed. Cir. 2005). Under the jurisprudence of In re Donaldson Co., Inc., the sixth paragraph of § 112, which states that a means-plus-function claim shall be construed to cover corresponding structure, material, or acts described in the specification and equivalents thereof, applies to claim interpretation arising as part of patentability determination by the Patent and Trademark Office. In re Donaldson Co., Inc., 29 USPQ2d 1845 (Fed. Cir. 1994).

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direction opposite said first direction, if any, and storing said received data in said memory of said sensor pod."

Likewise independent claim 113, as amended herein, includes the structural limitation of having a telemetry communications path that is designed and arranged to transfer data in a bucket brigade fashion, where a bucket brigade transfer is defined generally as above.


As discussed above, neither Zimmer nor Endo disclose or suggest this function. Therefore, independent claims 96 and 113 are not rendered obvious by Zimmer in combination with Endo. Because independent claim 96 is patentably distinct over Zimmer in view of Endo, claims 97-103, 105, 106, 108-110, and 112, dependent thereon, are also patentably distinct over Zimmer in view of Endo.

In summary, claims 20-22, 24-74 and 96-113 remain in the application and, as amended, are believed to be novel, patentably distinct and in condition for allowance. Allowance and passage to issue is respectfully requested.

Respectfully submitted,

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